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Oil and gas report on North Louisiana and South Arkansas. Part One. Oil and gas fields of North Louisiana and South Arkansas. Part Two. Probability of future production North Louisiana and South Arkansas

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Department:

OIL AND GAS REPORT

ON

NORTH LOUISIANA AND SOUTH ARKANSAS

BY

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THESIS

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C O N T E N T S

PART II

INTRODUCTION.

The purpose of this report is to furnish a general outline of the oil and gas fields of South Arkansas and North Louisiana. To properly cover the subject, the report is divided into two major parts, the first part dealing with the present and past producing territory, and the second part with probable future producing territory.

The first part deals exclusively with the producing fields and sets forth the actual recovery of oil and gas to date, the area in square miles and the various horizons producing.

The second part attempts to segregate the territory as covered by the accompanying map, into two classes, viz: territory favorable to the accumulation of oil and gas, and territory not considered favorable at this time.

There are many phases to a determination or segregation of this kind, only a few of which can be taken up at this time. For the purposes of this report, the following points will be touched upon:

1. Source of Oil and Gas.
2. Factors influencing its accumulation
3. Distribution of present favorable and unfavorable reservoirs.

4. Depositional features favorable and unfavorable for the retention of Oil and Gas.

5. Economic considerations based on the location, withdrawal, storage and disposal of the Oil and Gas.

NOTE: In answer to each of the above questions many scientific arguments are involved. New discoveries and inventions may completely change each opinion. At the present time, however, the author will attempt to base his conclusions on his own experience and knowledge of this territory.

P A R T O N E

O I L A N D G A S F I E L D S

O F

NORTH LOUISIANA AND SOUTH ARKANSAS.

The North Louisiana and South Arkansas oil and gas territory as covered in this report, comprises all of that territory lying south and southeast of the Cretaceous outcrop through Hempstead and Clark Counties, and extending south to the crest of the Angelina-Caldwell monoclinal flexure. The western limit coincides with the Texas state line and the eastern limit reaches to the trough of the great depositional syncline running northwest and southeast through Grant, Jefferson, Cleveland, Drew and Ashley Counties, Arkansas, and the Parishes of East and West Carroll, Louisiana.

Fifteen producing oil and gas fields have been developed to date within the limits of this territory, and the probabilities are that as many more will lated be developed.

These fifteen fields are briefly taken up in the order of their discovery. No detailed histories or contour maps will be incorporated in this report in-as-much as practically all the fields have been ably handled in various reports by authors of the Bureau of Mines, United States Geological Survey, and Geological Societies.

C A D D O F I E L D

C A D D O P A R I S H

L O U I S I A N A

The Caddo Field comprises all the oil and gas producing territory in Caddo Parish, Louisiana, north of Shreveport.

The discovery well of the field was drilled in as a large gasser by The Producers Oil Company, in Section Seven, Township 20 North, Range 15 West, in May, 1905. The first production figures available show that during the year of 1906, 3,358 barrels of oil was produced.

Since 1906, new sands, isolated pools and extensions to the original territory have been developed until at this time the total production from this field has passed the one hundred and three and a half million mark from a total of 31,000 acres.

Gas was discovered in 1907 in the Oil City-Vivian Field and has been used to supply the city of Shreveport and towns en-route. The history of this field in-so-far as gas is concerned, has been one of deplorable waste and uncertain drilling methods. The gas was never properly metered, and no one will ever know just what the field really produced.

The producing horizons are the Nacatoch, Chalk Rock or Annona; Woodbine, which is probably a basal sand of the Eagle Fords, and the Glen Rose Anhydrite of the Trinity group.

So far as can be ascertained no wells have ever been drilled below the Glen Rose, but the writer believes that a deeper oil sand will be developed within the Trinity group, possibly some five to seven hundred feet deeper.

The Blossom horizons seem to be a persistant water carrier wherever tested, and therefore cannot be considered as a factor in estimating the ultimate production.

The Nacatoch has produced considerable heavy gravity oil at Hosston, but will probably be of little economic importance elsewhere in the Caddo Field.

It is difficult to accurately estimate the total future production of Caddo, but from a study of the production curves to date, based on the Woodbine production and considering the possibilities of extensions, it is estimated that some 16 million barrels are yet to be produced.

In certain portions of Caddo, notably in Township 21, Range 15, the Annona or Chalk Rock produces a high gravity oil. This production was first developed in 1912, but it was not until 1920 that much attention was given it. Production statistics from this horizon are unavailable owing to the fact that the oil was mixed with lower grade production and run as high gravity oil.

Production from the Lower Cretaceous horizons was first developed in the Dixie Oil Company's Robertshaw 29, located in Section 14-21-15, on December 14, 1920. No production statistics from this horizon are available, and therefore no ultimate production figures can be derived. It has, however, been estimated that Lower Cretaceous Production will amount to one-fortieth of that obtained from the Woodbine or around three million barrels. It is the writer's belief that this figure will be found to be a low estimate.

Assuming that the aggregate productive acreage will total 60,000, based on a well drainage area of 10 acres per well for each producing horizon, the total yield per acre will be somewhat in excess of 2,030 barrels.

RED RIVER - DE SOTO FIELDS

RED RIVER AND DE SOTO PARISHES,

LOUISIANA.

The Red River-DeSoto Oil and Gas Fields lie some 30 miles southeast of Shreveport, and in the Parishes of Red River and DeSoto.

In 1912 gas was discovered in the Nacatoch sand at a depth of 800 feet near the town of Naborton. In May, 1913, the Gulf Refining Company brought in the first commercial oil well on the Jenkins farm. Since that time extensions have been brought in and the Abington and Creighton districts added their oil to the production of Louisiana.

The so-called Woodbine sands have furnished practically all the production of oil to date. These sands are found below one or more beds of limestone. They seem to occur through an interval of 50 or 100 feet and are therefore less regular in production. This, together with the fact that the oil sand is interbedded with lenzes of shale, has given the field the aspect of being "tricky". Wells offsetting gushers frequently are either dry or very small producers.

To date the field has produced some forty three and one half million barrels of oil, and the estimate for ultimate recovery from the Woodbine has been placed at around 57 million barrels.

The Nacatoch and Blossom horizons seem to be barren of oil in these fields, so little or no value can be placed upon them as ultimate producers. The Lower Cretaceous producing from the "Glen Rose" in Caddo is, however, regarded as having good possibilities of greater value. I have therefore given the Lower Cretaceous an ultimate production of 1/20th the amount of the Woodbine, or approximately three million barrels.

PELICAN DISTRICT

DE SOTO AND SABINE PARISHES

LOUISIANA.

Several wells drilled in the southern part of DeSoto Parish and the northern part of Sabine Parish opened up a small oil pool in the vicinity of Pelican.

The production comes from the same sand as the DeSoto-Red River field, or it's equivalent. The depth ranges from 2800 feet to 3200 feet in the southern part of the district. The oil found ranges from a heavy oil to a gravity of 38 to 40. On account of the small amount of sand present and the small initial production, this field has never paid operating expenses and no new wells are being completed.

The Producers Oil Company's Logan No. 2, in Section 22-10-12 West, was the discovery well, being completed as a gas well on March 17, 1912. This well is now dead and has been abandoned. The production from this area has never amounted to anything.

THE MONROE GAS FIELD

OUACHITA - MOREHOUSE AND UNION PARISHES

LOUISIANA.

The Monroe Gas Field is located in the Parishes of Ouachita, Morehouse and Union in the northeastern part of Louisiana.

The field was discovered in 1916, and is now the largest gas producing field in the world, comprising some 300 square miles of proved territory.

The gas is found in two horizons in some parts of the field, while in other parts only one horizon is present. The general accepted theory as to the age of the first horizon is Annona based upon a few fossils blown out of the wells. From a lithologic correlation of well logs however, one is lead to doubt this and place the horizon as the equivalent of the Nacatoch in El Dorado.

The gas is used to supply the town of Monroe and Alexandria. By far the greatest quantity, however, is burned in the field in making carbon black. The total daily withdrawal for this use amounts to 388 million cubic feet.

The ultimate production of gas available from the Monroe Gas field has been estimated at 1,021,275,000,000 cu. feet at 8 oz. above atmospheric pressure. Of this amount 488 billion cubic feet have already been withdrawn.

The average rock pressure of the field had declined from an initial of 1100 to a present pressure of 800

pounds. At the present rate of withdrawal it is doubtful if the field will produce for over eight more years.

No oil has so far been discovered in this territory and until the lower Cretaceous is thoroughly tested nothing can be definitely said as to it's possibilities.

E L M G R O V E

B O S S I E R P A R I S H

L O U I S I A N A

The Elm Grove field, essentially a gas field, is located about 20 miles southeast of Shreveport in Township 15 North, Range 11 and 12 West.

This field was brought in during January, 1916, with the discovery well of the Louisiana Gas Company.

The Nacatoch and Woodbine sands are both gas producers and have for a long period helped supply Shreveport with natural gas. Over 113 billion cubic feet of natural gas has already been taken from this field and the rock pressure has dropped to such an extent that compressors are now being used on all lines. It is doubtful if this field can be counted upon for any quantity of gas for over two years longer.

The Gulf Refg. Company's Hodges No. 1, in Sec. 24-16-12, was completed in September, 1916, as the first oil well. Oil is now being produced in Sections 18 and 19, Township 16 North, Range 11 West, and Sections 13 and 24, Township 16 North, Range 12 West. This oil is of a low gravity and comes from the chalk rock or Annona age. The depth below surface is around 1500 feet.

The total production of oil from this field to

date amounts to one million barrels. The ultimate production has been estimated at three million barrels from the chalk rock.

T H E S H R E V E P O R T G A S F I E L D

C A D D O P A R I S H

L O U I S I A N A

The Cedar Grove or Shreveport Gas Field is located about six miles south of Shreveport in parts of Sections 29 and 30, Township 17 North, Range 13 West, and Sections 25 and 36, in Township 17 North, Range 14 West.

The first well was brought in in 1916, and from the wells subsequently drilled, the city of Shreveport and nearby towns were in part supplied with gas. The field was exhausted in 1918, and since then the field has been of little importance as gas territory, being drowned out with salt water.

The original rock pressure was 1030 pounds, while the present rock pressure is only 15 pounds. The total area of the field comprised some 2500 acres. The producing sand was Nacatoch and no deep tests ever produced anything of commercial worth.

H O M E R F I E L D

C L A I B O R N E P A R I S H

L O U I S I A N A.

For a long period of time it was thought by many geologists that the territory between the Sabine uplift and the Ouachita uplift or Monroe Gas Field was a great geosyncline and, therefore, unfavorable for the accumulation of Oil and Gas.

On January 14, 1919, the Consolidated Progressive Oil Corporation brought in the discovery oil well of the Homer Field.

This field is of small extent and divided through the center of an East and West block fault. The production on the north side of the fault comes from the Nacatoch sand while both Nacatoch and Blossom produce on the south side.

The total productive acreage on both sides of the fault amounts to 2,542 acres with a total of 620 producing wells, averaging one well to each 4.00 acres. On account of this close spacing and the indifference to the methods of completing the wells, the field has gone to water at an alarming rate. At the present time the field is producing 7,510 barrels of oil. Many wells are being blown with air, pumped on a vacuum and swabbed.

To date this field has produced 48.9 million barrels of oil. The ultimate production has been estimated at 61,000,000. This amount is probably greatly in excess of

the actual amount that will be recovered.

Production from the Woodbine and Lower Cretaceous was for a long time expected but it seems now that sufficient deep tests have been drilled to practically condemn at least the Woodbine.

E L D O R A D O F I E L D

U N I O N C O U N T Y

A R K A N S A S

It was not until April, 1920, that South Arkansas was given much attention as a probable oil producing territory.

The Constantine Oil and Refining Company drilling in Sec. 12-18-16, Union County, brought in a 30 million cubic foot gasser at that time which was the Discovery Well of the field. It was not until January 10, 1921, that oil was discovered in the Busey Well.

Although the field has produced as high as 77 thousand barrels of oil daily, the decline has been rapid and is now only 12,840 barrels.

On account of the wild scramble for acreage and the race to get wells down to the pay sand, careful and scientific drilling methods were sidetracked for the haphazard methods prevalent in all boom fields. Wild wells were common, water shut-offs improperly made and as a consequence the field was butchered. However, 34,223,190 barrels have already been produced from the main field and east extension combined, and it is estimated that 6 million barrels are yet to be recovered, giving a total ultimate yield of about 40 million barrels or about 4,020 barrels per acre.

Practically all the production is coming from the Nacatoch sand which is found at a depth varying from 2100 to 2200 feet below the surface.

The Woodbine sand at El Dorado is picked up about 2900 feet below the surface. This horizon produces some oil, but so far has made no appreciable boast in production. At the present time the Arkansas Railroad Commission reports four wells averaging about 100 barrels each.

H A Y N E S V I L L E F I E L D

C L A I B O R N E P A R I S H

L O U I S I A N A

On May 10, 1920, the Roxana Petroleum Corporation abandoned their Taylor No. 1, in Sec. 14-23-8 as a dry hole at a depth of 2850 feet. This well passed through the Blossom sand but no test was made, cores taken or slush examined. Lack of careful drilling in this one well cost the Roxana millions of dollars for it has since been proved to be situated in the field. Production has now been obtained in all directions from this well.

Smitherman & McDonald brought in the real discovery well on March 30, 1921, just 500 feet south of the Roxana test. This well came in for around 3000 barrels of clean oil daily.

The Haynesville Field now comprises about 5,875 acres and has 743 wells producing. The present daily production amounts to 17,980 barrels and since the date of discovery 38,490,125 barrels have been produced.

Haynesville is known throughout the Midcontinent Area as one of the best operated fields. All the leases are in first-class condition, wells regularly spaced averaging one well to ten acres. The best approved methods have been used in the development, with the result that oil, gas, pressure and water troubles have been handled correctly. No great

waste of money or natural resources have attended developments.

This good record which will probably result in a greatly extended life for the field, was brought about by several factors.

First, and probably the most important of these was the fact that most of the acreage was controlled by the legitimate oil producing companies of that section. No boom came with it's accompanying townsite drilling and wild uncontrolled wells. Line fights were exceptions rather than the rule. The companies all co-operated with each other and with the Department of Conservation. Probably to the Conservation Commission at Shreveport is due much of the credit for this spirit of co-operation on the part of the Operators. Many important debates were settled by it's advice and intelligent legislature.

The producing sand in this field is of Blossom age or at least of lower Brownstown. Shows have been reported in the Nacatoch sand, but to date no commercial wells have been completed from this horizon.

Production from the Woodbine and Lower Cretaceous are possible and if obtained will undoubtedly make Haynesville the best paying field in this territory.

The writer knows of no commercial production from these lower sands except on the Sabine uplift and at El Dorado where a few commercial wells have been completed in the Woodbine. Therefore any prediction concerning oil possibilities from these sands seem unwise at this time.

B E L L E V U E F I E L D

B O S S I E R P A R I S H

L O U I S I A N A.

The Bellevue Field located in Township 19 North, Range 11 West, Bossier Parish, Louisiana, was discovered by R. O. Roy and J. Y. Snyder on November 13, 1921, in Section 7. Before this discovery deep tests had been drilled around the area and the presence of the structure was well known. Small wells making from 2 to 12 barrels had been completed in the Woodbine, and the Lower Cretaceous had been tested.

The field proper consists of some 1250 acres located on the top of a dome of the asymetrical variety, having some 500 feet of Closure.

For a considerable time this field was thought to be the reflection of a deeply buried salt dome. Deep tests however, have given no indication that this condition exists and it is now the popular opinion that the field is on the main northeast southwest cross fold of the Sabine uplift and is probably the nodal point of folding on that uplift.

The production is all from the Nacatoch horizon which is found at a depth of from 60 to 100 feet below sea level or around 300 feet below the surface. Wells are drilled with both Rotary and Armstrong Rigs at a cost of from $1650. to $2500. The lifting cost in this field is around 26¢ per bbl. including treating. The oil is 19.3 degrees Baume and is high in lubricating content.

Initial production in some of the wells ranged from two hundred barrels of P. L. oil to 10,000 barrels of fluid, 40% of which was oil. Water has come in in large quantities but production still holds up very good.

To date 5 million bbls. have been produced and it is estimated that 5 million bbls. are yet to be produced.

The Blossom, Woodbine and Lower Cretaceous all offer good possibilities for future production on the sides or flanks of the dome where the sands are more highly developed. The Woodbine has already shown the presence of High Grade Oil (Roy-Smith Well 7-19-11) 38.2° gravity.

Gas from the Lower Cretaceous has been produced by the Standard Morey 1 (28-19-11) which produced from the top of the Trinity.

STEPHENS FIELD

OUACHITA & COLUMBIA COUNTIES

ARKANSAS.

The first commercial well to be brought in within the limits of the Stephen Field was drilled by Hude & Aarnes on the Brown farm in Section 13, Township 15 South, Range 20 West, in June, 1922.

Several other wells had been completed prior to this date with small shows of oil which attracted some attention, but leasing and development did not commence until the Hude-Aarnes well was completed.

The production in Stephens comes from the Blossom horizon which contains about an average of two feet of sandy shale.

About 3,200 acres have proved productive, and 225 wells averaging 10 bbls. each are now producing.

The field is unquestionably a non-commercial proposition, no wells have ever paid out and few, little more than pay operating costs.

Unless better production is obtained from the Nacatoch or one of the deeper horizons the life of the field will be very short.

At the present time no deep tests have been made on the structure and but a few wells have tested the shallow Nacatoch sand. Nacatoch oil "shows" and some good

oil has been found but no commercial wells developed as yet. The sand conditions and low closures for the structure indicate that the oil trap is a poor one at best and can probably be classed as a non-commercial proposition until such time as the value of the oil is greatly increased.

To date the field has produced 1,315,730 bbls. of oil, or an average yield per acre of 411 bbls.

S M A C K O V E R F I E L D

O U A C H I T A & U N I O N C O U N T I E S

A R K A N S A S

The Smackover Oil and Gas Field is located in Ouachita and Union Counties, Arkansas. The field was discovered in May, 1922, when the Oil Operators Trust Co's. Murphy 1, Section 8-16-15 came in, cratered and blew wild until later it bridged over. The V. K. F. Co. completed the first oil well in July, 1922, in Sec. 29-15-15.

From the drilling in of this first oil well development has been very rapid until an aggregate area of some 55 square miles has been developed. The field extends 6 miles from N. to S. and 12 from E. to W.

Wells with a flush production of from 10 to 25 thousand bbls. were common during the early age of the field. This, together with the great size of the productive reservoir, enticed Oil Companies and promoters to pay tremendous prices for some of the acreage. Stock selling schemes were common and soon the name of Smackover was known through the Country.

This field is probably the largest continuous area of flowing wells ever brought in within the limits of the Midcontinent and Coastal Regions. Earthen storage was the only means of taking care of this oil and consequently great storage pits were excavated and filled. It is estimated That the earthen storage in Smackover field will accommodate thirty million barrels of oil.

Production is obtained from the Nacatoch, Marlbrook and Blossom horizons. The Nacatoch produces the heavy oil around the Norphlet and Smackover regions and was the source of the large spectacular wells. Around Louann the Marlbrook produces light oil, while in the Smackover and Norphlet area it produces gas with evidence of oil in commercial quantities along the flanks.

The Blossom sand produces where tested in the Western area south of Louann, but the sand is thin and water troubles are difficult of solution. The oil is of a heavy gravity and the wells average around 20 bbls. For this reason the Blossom will not pay out in that territory. Around the Smackover and Norphlet areas, however, the writer believes the Blossom an excellent prospect for future production. Structural conditions are more pronounced and the sands are probably better developed in this area than elsewhere in the Field. This is evidenced by loss of deep wells drilled off structure. To date no well has tested the Blossom sand in the Heavy Oil Territory around Smackover and Norphlet.

From discovery to date, 66,128,400 bbls. of oil have been produced. It is estimated that the ultimate average

recovery per acre for the heavy oil will run around 3000 bbls. Many small tracts favorably located and properly operated will probably exceed the 25,000 mark per acre.

The light oil around the Louann sector is estimated at 2000 bbls. per acre. This area is comparatively small and no spectacular exceptions to this average are expected.

The Marlbrook or light oil sand and the Blossom sand have excellent chances around Norphlet and Smackover.

Before abandoning a lease, well located on structure, at least one well should be drilled to the lower Cretaceous.

NEVADA COUNTY FIELD

NEVADA COUNTY

ARKANSAS.

On September 17, 1922, Ames & Zingg completed their Waters well located in Sec. 11-14-21, Nevada County, Arkansas. This well soon filled up with a heavy blackish oil around 14 gravity.

On the completion of the second well in this territory by Steel & Sandlin, activity started up and several big companies bought acreage, paying as high as $200.00 an acre.

Later development proved the field to be very small. One good sized gas well was completed by the Dixie Oil Company, but other wells either proved barren or produced small heads of the heavy oil and much water.

No pipe lines have been constructed and the present production is being shipped by rail over an old logging road.

The oil is high in lubricants, but owing to the difficulties encountered in it's refining there is no market for it other than fuel oil and use in road work.

No deep test has been drilled on the producing structure, but deeper production seems to be rather doubtful

on account of the extreme small size of the upper reservoir "Nacatoch" and the nearness to these limits of the dry deep tests.

The total production to date is estimated at 431,290 bbls. Owing to the comparative newness of the field and lack of accurate production statistics, it is impossible to estimate the ultimate production. The daily production is now 1,420 bbls. from 18 wells.

NORTH WEBSTER GAS FIELDS

WEBSTER AND BOSSIER PARISHES

LOUISIANA.

The North Webster Gas Field is usually taken up as three distinct fields. For the purpose of this report, however, it will be considered as one field reaching from Township 23 North, Range 12 West, to Township 23 North, Range 9 West.

The first well in the area is known as the Munn well located in Section 1, Township 22 North, Range 10 West, and was completed October 6, 1921. The initial rock pressure was 1200 lbs. and the open-flow 44 million. Subsequently, many other wells were drilled extending the field to the north and west. At the present time the field is so poorly outlined that a definite idea of it's ultimate size is impossible.

The Production is obtained from the Blossom sand at a depth of from 2550 to 2750 feet, depending upon elevation and position on structure.

The Nacatoch sand shows some gas where tested and in Township 23, Range 11 West, developed a good oil show.

The Marlbrook at 2178 in Lloyd Harris No. 2, was tested and developed one-half million cu. ft. of gas.

The Woodbine has been tested by two wells drilled on Structure, but both were failures although one showed gas and oil in some quantity.

Oil has been developed in three wells belonging to Lloyd Harris in Township 23 North, Range 11 West. On account of the volume of gas and high rock pressure it is difficult to produce this oil. However, the wells are averaging 71 bbls. each, and have produced a total of 32,000 bbls. of pipe line oil.

Colonel Estes now has a small oil well in Section 15, Township 23 North, Range 11 West, and the Atlantic Oil Co. has a pumping well in Sec. 24, same township and range. These wells are not yet old enough to indicate their possibilities.

C O T T O N V A L L E Y

W E B S T E R P A R I S H.

L O U I S I A N A

The Cotton Valley Field located in Township 21 North, Range 10 West, Webster Parish, Louisiana, was discovered on August 25th, 1922, by the Webb, et al, Merritt No. 1, located in Sec. 13.

This well came in for about 30 million cu. ft. of dry gas at a depth of 2475 feet.

Subsequently other large gas wells were drilled around the Webb well and the field was considered a good gas reservoir. The Palmer Corp. built a gas line connecting Shreveport with the field and it was thought this would supply sufficient gas for a number of years.

On May 19, 1924, the Ohio Oil Co. completed their Bodcaw Lbr. Co. Well No. 3 in Section 15, Township 21 North, Range 10 West, as a 2700 bbl. oil well. This well soon went to salt water but it precipitated a closely spaced drilling program, resulting in the bringing in of 30 producing oil wells to date. This number of wells has necessarily wasted great quantities of the gas and the rock pressure has dropped to around 500 lbs.

The field is now at the heighth of it's first period of development and has already produced 541,980 bbls. of pipe line oil. The production is coming from the Blossom horizon and is accompanied by great quantities of salt water indicating a short life.

It is doubtful now whether or not the field will ever pay out, high prices were paid for the acreage and drilling costs are comparatively high for this section of the country.

The two chances to change the field from a loosing proposition to a paying one consist of finding a good oil accumulation on the southern flanks of the structure or good production from the lower Woodbine sands.

M I N O R

P R O D U C I N G

- T E R R I T O R I E S -

Some oil has been produced around Plain Dealing in Bossier Parish, Louisiana, but subsequent wells drilled all around the producer failed to develop anything.

Sabine Parish has produced some little heavy oil from the Tertiary formations around Zowolle, but nothing commercial has yet been developed.

On November 7, 1923, Davidson & Palmer completed their Frost-Johnson well located in Section 18, Township 23 North, Range 1 East, producing 300 bbls. of fluid about 7 per cent of which was 36 gravity oil. This well precipitated drilling around this territory known as the Farmersville Area. On account of the nearness to the flanks of the Ouachita uplift or Monroe Gas Field correlating of sands was extremely difficult. Indications pointed to the presence of a closed structure centering around Section 23, Township 23 North, Range 1 West. Subsequent drilling disproved the closure and the territory has now been abandoned after more than a million dollars had been spent.

A large gas well came in in April, 1924, located in Section 27, Township 10 North, Range 2 East, LaSalle Parish, La. This well drilled by the Stovall Drilling Company, made about 35 million cubit feet of gas and 2500 bbls. of fresh water. The production comes from a depth of 1445 feet and is presumed to be of Wilcox age.

PART TWO

PROBABILITY OF FUTURE PRODUCTION

NORTH LOUISIANA AND SOUTH ARKANSAS.

1924.

GENERAL TERRITORY COVERED:

The territory dealt with in this report consists of all that land lying in South Arkansas and North Louisiana, south of Township 5 South, Arkansas, and North of Township 15 North, Louisiana, lying south and southeast of the Cretaceous outcrop through Hempstead County, Arkansas.

SOURCE OF THE OIL AND GAS:

The writer accepts the organic theory of the distillation of animal and vegetable remains as the origin of the oil and gas found in this territory.

That the oil is indigenous to the sands within which it is found, or at least has its origin in the bituminous shales directly underlying or overlying the sands is well demonstrated by a study of the chemical analysis of the oils found here. One example of this is indicated in the three grades of oil in the Smackover field in Arkansas. Macatoch oil, heavy; Marlbrook oil, light; Blossom oil, heavy; all three having separate and individual characteristics. Other examples are to be found in nearly all the fields producing from horizons of different age. Should the oil be coming

entirely from a deep seated origin one would expect a gradation in certain qualities of the oil in each of its successive upward reservoirs. This, however, in many instances, is contrary to facts.

I do not mean that oil will not migrate upward through fault planes and fissures, this very thing has probably taken place to a great extent within the various sandy phases of certain oil producing horizons. This accounts for various lenzes or strata of sands being alternately barren or productive of either or all three, oil, gas and salt water. I do not believe, however, that in the loosely unconsolidated Gulf Coastal sediment, consisting of great thicknesses of plastic clays and soft shales, that oil will migrate upward any great distances.

FACTORS INFLUENCING THE ACCUMULATION OF OIL AND GAS IN NORTH LOUISIANA AND SOUTH ARKANSAS.

That oil and gas will migrate up dip along porous strata has been definitely proved. How far this migration will go and the time necessary to travel any certain distance is unknown. Undoubtedly this rate of travel is very slow.

Folding and deformation causing closed structures, anticlines, domes, etc. increases the dip or slope in all directions around the central highest portion. Oil and gas in small quantities in the sands around these highs immediately starts migrating upward due to variations in specific gravity, capillarity and other less important factors. Assuming that all the productive sands in this area are fundamentally salt water carriers, it will be seen that the accumulation of the hydrocarbons on the crest of the structure will force the water back farther and farther down the dip. The hydrocarbons themselves will adjust their levels due to their inherent differences in sp. gr. capillarity, etc. The pressure exerted on this receding rim or level of the water on the structure is somewhat greater than the hydrostatic head due to the pressure exerted by the liquids seeking their respective specific levels. This no doubt is the reason why a discovery well in a virgin territory almost invariably has a rock pressure in excess of that expected from the hydrostatic head. It is also true that a well drilled close to a structure containing undiminished oil and gas will often flow salt water under a pressure greater than hydrostatic head. This phenomena then is one to be given some consideration in prospecting for favorable structures in this territory.

The oil bearing horizons in this territory dip gently from the outcrop in a southeasternly direction toward the Gulf. Where any considerable territory is unaffected by secondary folding this dip varies from thirty to fifty feet to the mile from the outcrop, south to the Angelina-Caldwell Monoclinal Flexture. From this flexture south the dip is much steeper and the Cretaceous formations are buried deeper until in the southern portion of Louisiana they are buried beyond drilling depth by several thousands of feet of younger formation.

If migration of oil and gas within a sand body takes place comparatively easy and covers large areas, one would expect to find large fields of both oil and gas along the Angelina Flexture. Undoubtedly settling, folding, and faulting has produced sufficient structures or traps for the retention of these substances as they migrated up the steep dip from the Gulf regions.

The territory here discussed, however, is limited on the south before reaching the flexture and it is the writer's opinion that the oil and gas found here have not migrated any great distance.

Carefully drilled wells located on flat areas most always give a good show of oil in the salt water. This oil is not sufficiently congregated to make a commercial pro-

position owing to a lack of developed structure within migration limits. An example of this is in the flat territory around Farmersville, La., west of the Ouachita uplift.

SAND CONDITIONS:

Sand conditions undoubtedly play a great part in the accumulation of Oil and Gas, particularly in the southern portion of Arkansas. Folding apparently has been much less intense and the fields already producing are more or less limited by the character of the sand. In other words, a large flat area or lessening, or breaking of the normal dip furnishes ideal locations for test wells providing well records point to an abundance of sand within the Cretaceous productive horizons.

From a study of the producing fields of this character such as El Dorado and Smackover, one finds the contours greatly affected by the undulating surface of the productive sands. Areas of thick sands on the flats almost invariably are areas of large wells while the reverse is generally true where the sands are more broken, thiner and becoming highly argellaceous or calcareous.

One important fact to be kept in mind while looking for new territory in South Arkansas is that the fields

are invariably closely associated with faults with the down thrown side usually barren. A study of Nevada County Field, Stephens Field and the Smackover Field leads to the suggestion that these fields were formed by a superposition of sediments on an old fault scarp of the basement pre-Cretaceous rocks. Subsequent settling could easily be reflected as structure in the Cretaceous and younger formations.

DISTRIBUTION OF PRESENT KNOWN FAVORABLE AND UNFAVORABLE RESERVOIRS:

Many attempts have been made to draw lines along major folds and cross folds with the hope of being able to give some indication of territory likely to contain other folds. Prof. Harris attempted this in South Louisiana with the Salt Domes or Salines there, but apparently with no success.

In this report lines have been drawn on the enclosed contour map which the author believes may be of some benefit, at least in indicating areas well worth special investigation.

From a study of the contour map, or rather from the progressive stages involved in the making of the map, it seemed apparent that there was at least two and probably three periods of folding. Two of these periods produced major anticlinal folds along directions at variance to each other. The third period of

folding which seems to be a Salt Dome forming epoch probably terminated at a much later time than the other two periods. Whether or not these salt domes form a separate direction of folding or coincide with one or both of the previous folds, it is impossible to say. I believe, however, that only two main directions of folding are of importance.

Before discussing these directions of folding one must consider at least four major geological features within this territory.

1. Sabine Uplift.
2. Ouachita Uplift.
3. Angelina Caldwell Monocline.
4. Depositional Syncline to the East.

SABINE UPLIFT:

First, and probably most important on account of oil and gas production obtained upon it, is the Sabine Uplift. No attempt can be made here as to a discussion of its origin. Briefly it is a long geanticline extending from the northwest part of Caddo Parish southeast to the DeSoto-Red River Fields. This fold "high" has been referred to by some writers as the Sabine Peninsula and in my opinion this term is more descriptive of its true nature. This peninsula as I prefer to call it, forms

the western boundary of the oil and gas territory under discussion.

From this Sabine uplift the formations drop off to the east into a large broad syncline until they reach the Monroe Gas Field. This Gas Field is situated on what I have called the Ouachita Peninsula.

OUACHITA UPLIFT:

The Ouachita uplift is on the order of the Sabine Uplift in that it seems to be a peninsula of approximately the same shape and extent and with a parallel trend to the major axis of the Sabine. The southern extent of this peninsular is limited by the extension of the Angelina Caldwell monocline. It extends to the northwest into Arkansas a much greater distance than the Sabine Peninsula. Marked unconformities seem to separate practically all the horizons in this area and the logs are so greatly different from a palenontological and lithological aspect that few or no facts regarding it's possible origin have been set forth. That it has at various times been the seat of great volcanic disturbances is now practically certain. Lava flows and beds of volcanic ejectamenta breccia having been passed through in several wells.

DEPOSITIONAL SYNCLINE:

Paralleling the east flank of the Ouachita Peninsula and extending north-westward from the vicinity of Vicksburg into Grant and Jefferson Counties, lies a deep depositional Syncline. Few wells have been drilled sufficiently deep to make contouring at all reliable. Depositional changes as evidenced by the well records are extremely abrupt. Abundant lignite, vast thicknesses of loose sands, petrified woods, etc. are found in abundance down to the Midway. Whether or not there are any Arkadelphia clays present is unknown; however, inasmuch as the Ripley formation, the equivalent of the Nacatoch, in the youngest Cretaceous formation known in Mississippi, it is doubtful that any considerable amount of Arkadelphia is present especially on the eastern flank of the Syncline. It seems quite probable that this syncline is but a reflection of a great fault or major syncline in the Paleozoics.

ANGELINA-CALDWELL MONOCLINE:

The Angelina-Caldwell Monocline is in my opinion of considerable importance in the interpretation of the directional axial folding. This flexture is known to extend from Angelina County, Texas, through Louisiana north

of Natchitoches, Winnfield and Columbia to the Mississippi River North of Vicksburg. It began to develop in Tertiary time, perhaps as early as the Oligocene, and is still a line of weakness (Veatch, pp. 46).

To date no oil or gas fields have been brought in on this monocline or south of it with the exception of the Salt Dome Fields of South Louisiana, and the Nacogdoches oil field in Texas.

The four major features above described seem to me to be the only features of primary importance with the possible exception of the line of outcrop of the Cretaceous beds northeast through Hempstead and Clark Counties, Arkansas, which is in reality the southermost extension of the old Ouachita positive shield of Paleozoics.

LINES OF FOLDING:

During the progressive work of making the contour map the east and west trend of anticlinal folding just south of the Arkansas state line was noticed.

Other parallel trends to the south were then easy to pick out and consequently I have drawn lines paralleling each other in a due east and west direction through these folds.

These lines seem to indicate the presence of low parallel folds reaching from the Sabine to the Ouachita Peninsulas and dying out before completely crossing them. These regular folds seem to a certain extent to parallel the direction of the Angelina Caldwell flexture to the South and are possibly a result of pressure exerted by the great geosynclinal prism of sediments to the South.

Striking somewhat at variance to these folds and running northwest and southeast approximately parallel to the flanks of the Sabine and Ouachita Peninsulas, and also closely following the strike of the deep depositional syncline to the east, are a series of folds or anticlines. The strike and location of which are shown on the map by the northwest and southeast lines. These lines are shown as parallel for the reason that I believe, their main tendency is to be parallel. However, in some instances the parallel trend has been interrupted and crumpled. This folding may be due to the collapse of the Mississippi embayment or to a gradual pressure exerted by the weight of the prism of sediments to the East. In any event the folding seems to have been relatively intense and to have produced roughly parallel folds.

It is at the intersection or crossing of these folds that I wish to bring especial attention as it is in these places that the east and west folds have been re-subjected to compression. Domes, quaquaversals or clover shaped structures have been formed, and all so far discovered that have proved to be real closed folds have produced either oil or gas in commercial quantities. The exception to this being the salt domes none of which has been sufficiently tested to thoroughly disprove the pressence of commercial bodies of oil and gas.

On account of the slowness or repeated periods of this folding or to local sedimentary conditions causing variations in these lines of crumpling, the exact intersection of the lines may be several miles from the true dome, but I believe that fields are probably hidden somewhere in the vicinity of these intersections. All territory within a radius of six or eight miles should be carefully studied from a surface and subsurface basis. All indications of structure should be carefully noted and given considerable weight.

TERRITORY NOT CONSIDERED FAVORABLE AT PRESENT TIME:

The Paleozoic rocks of northwestern Arkansas are

not considered favorable for the retention of oil owing to their highly folded character. Many gas shows have been reported in various localities and gas in commercial quantities is produced around Fort Smith.

It is the common opinion, I believe, that in this territory the Paleozoics have been folded and metamosphosed to such an extent that the oil if it ever existed has been changed to gas and destroyed by the heat and pressure.

One factor in support of this is the high ratio of fixed carbon prevalent in the coals of this region. Such areas are invariably devoid of oil although good gas reservoirs are often present.

Oil may exist below these highly folded strata but the depth one would have to drill is so far considered prohibitive.

The area lying within the true limits of the depositional syncline running northwest through the eastern portion of the territory is considered unfavorable by the writer. There are apparently no impermeable caps of gumbo and shale present to keep the oils from disseminating through the overburden of loose sands and gravels, as is represented by the Arkadelphia to the west. Practically all the horizons producing in South Arkansas and North Louisiana, are buried

to a considerable depth and prospecting is therefore very expensive. One other factor of some importance is the steep dip of the flanks of this syncline and it's comparatively narrow base. It seems highly probable that should there be oil or gas within the sands under a sufficient impermeable cap to restrict it to the sand of its origin, that this oil or gas has long since migrated up these steep sides not being trapped in any considerable quantity by minor folds.

All other conditions being favorable it is possible that migrating oil would stop and accumulate against a tightly sealed fault regardless of which side was the upthrown or downthrown side. Indications of such a fault exist around Monticello and for this reason I do not feel that the area can be condemned for all time. The many factors enumerated above, together with other minor ones, does, however, remove this territory from practical consideration at this time.

For purposes of this report, all that area south of the Angelina-Caldwell flexture will be disregarded. It is probable, however, that no commercial fields will be brought in on the steep south dip. Oil and Gas fields should be located in the more recent formations overlying the Cretaceous in areas of favorable structures some distance south of the flexture.

DEPOSITIONAL FEATURES FAVORABLE AND UNFAVORABLE FOR THE RETENTION OF OIL AND GAS:

Throughout the entire territory contoured and south to the Angelina flexture depositional conditions can be considered as favorable for the retention of oil and gas with the exception of local areas devoid of sand deposition, such as the western part of Columbia County, Arkansas, and the depositional syncline to the east taken up under the preceeding heading.

ECONOMIC CONSIDERATIONS BASED ON THE LOCATION, STORAGE AND DISPOSAL OF OIL & GAS:

On account of the comparatively highly settled condition of the entire territory, numerous railroads and pipe lines, it seems that no serious drawbacks towards development and disposal of oil or gas could be expected anywhere within this region. Temporary difficulties will always be met in new areas owing to weather conditions, poor roads, distance from transportation, etc., but these will always be temporary and disappear as soon as fields are demonstrated to be capable of commercial production. On account of the numerous small stream beds, gently rolling terrain and soft clayey subsoil, earthen storage can always be resorted to for temporary handling of the oil. This earthen storage can be erected or converted from natural ravines and streams in a surprisingly short time.

S U P P L E M E N T.

SURFACE GEOLOGY:

Surface geology as it applies to the common reconaissance of territory, mapping dips, soil contacts, stream directions and surface topography, is in my opinion, worse than useless in areas of non-marine deposition.

Practically all the territory is covered by a mantle of reworked material; re-deposited and in some cases re-stratified Quaternary formations. Dips, surface slips and faults are very common but rarely indicate the true structural conditions. After a field is brought in it is common for the geologist to come in and map the structure from the surface. This is easily explained, many undoubtedly true dips exist but they are so mixed and associated with dips caused by differential settling, stream stratification, surface faults and slips which look like they are exactly as good material as the true dips, that confusion is inevitable. After a few wells have been brought in, the story is different. The geologist has an indication of an extension or nose in a certain direction from a study of the well logs, he then goes out looking for his surface dip, and if exposures are present, he finds them. Subconsciously he is throwing out the dips at variance with the ones he is looking for. Sometimes he is able to give a good

surface map of the extension, but seldom if ever has the extension come anywhere near agreeing with the dips, often it passes the reversals as though they did not exist, again the well defined nose will turn out to be a fault and practically have no production whatever.

It is the writer's own opinion that few if any true dips are present in South Arkansas oil producing territory.

Plane table work is out of the question. No mapable markers exist for any distance nor indeed are there any present. Some plane table work has been attempted using the top or base of lignite members as a key horizon. So far as known to me nothing of value has ever been worked out except further proof of the failure of this method in this territory. Lignites are common, they occur as lenzes in sand beds and also as layers in clay and sandy clay strata. No amount of chemical analysis or knowledge of the physical characteristics of certain outcrops of lignites has availed in the recognition of these lenzes, and correlating them seems impossible.

There remains then only two methods for the geologist in this territory to use as an aid in locating favorable territory for drilling. The first and most important is the subsurface work. This, to most of us here, means a study of

well logs plotted to scale on charts and colored so as to show the changing lithology. On account of the previous lack of interest in the records of these wells evidenced by the drillers and owners many of the logs are utterly worthless. Often the logs were made up from memory after completion of drilling, again an inexperienced driller would log pack sand where lime existed, sand for hard lignite is a common error, shale in certain forms is constantly confused with sand, and so on indefinitely. In spite of these handicaps the geologist who is familiar with the territory and who has the patience can draw a fairly accurate picture of true subsurface conditions. One who attempts this must expect to have his deductions and predictions absolutely reversed at any time as records of new and more carefully drilled wells become available.

COMPARISONS OF VALUES OF ROTARY LOGS VERSUS CABLE TOOL LOGS:

One often sees reports making allusion to the rotary method of drilling, stating that the logs are of course unreliable and in many ways condemning it for prospect work. I am sufficiently familiar with both cable tool and rotary methods of drilling that I do not hesitate to make the statement that I believe the rotary method to be far superior to

the cable tool method when conditions allow its use. A rotary drilling outfit in the hands of a good rotary driller and with the assistance of a formation man, can produce a log much more accurate than a cable tool outfit for a less cost. Measurements can be kept accurate at all times, cuttings in any desired quantity can be kept, and cores of sands or other formations easily taken. Besides this a good rotary driller, familiar with his territory, will seldom miscall a formation. The handicap that exists therefore is not due to the rotary method of drilling, but to the driller who runs the rig. Misnamed formations can often be identified and correctly named from a study of the logs in the vicinity. By far the greatest and most costly error is the habit of some contractors and drillers of carrying accredited holes. This is prevalent with both rotary and cable drillers, and often causes the useless expenditure of thousands of dollars in drilling other wells based upon the misinformation obtained from the "accredited" holes.

PALEONTOLOGY AND USEFUL FIELD WORK:

Paleontology rightfully belongs as an aid to both surface and subsurface geology. The microscopic forma-

nifera common in the well cuttings in this territory, although for the most part still unclassified, offer a more positive means of correlation, as yet however it has been of but little help except as a marker of Tertiary and Cretaceous. In the field with the surface geologists it is an entirely different matter and is very valuable in working our stratigraphy.

The second form of geological work adapted to this territory is the detailed examination of outcrops for fossile and physical characteristics that assist one in identifying the age. Inliers are present over practically all the fields of North Louisiana, but in many instances the material had been reworked to such an extent that it was unrecognizable before drilling proved its existence. For example, Veatch, pp. 46, mapped a Tertiary inlier in Quaternary sediments on what is now the Bellevue Oil Field, this "Tertiary" was probably Arkadelphia (Cretaceous), or Midway (Tertiary). Such work as this, however, is important and as Paleontology is better understood in this territory, so much better are the chances of locating favorable areas for oil and gas in advance of the drill.

TYPE SECTION FROM SOUTH ARKANSAS AND NORTH LOUISIANA.

Compiled from various references by H. D. Easton, of Shreveport, and published in graphic form.

AGE: CENOZOIC
SYSTEM: TERTIARY
SERIES: EOCENE
GROUP: CLAIBORNE

Member:

1. Yegua
(Cookfield)
(Gasport)

Logged as brown sand, water sands, clay, sand and boulders with some hard rocks.
The Yegua often carries beds of lignite, crystals of Selenite and petrified wood.
The average thickness in South Arkansas is around 600 feet.

2. St. Maurice Marine

Cook Mountain, Mount Selman,
Nacogdoches, Queen City,
Carrizo, Tallahatta, Lisbon.

About 450 feet of alternating shale, sand, glauconitic sands, lignite and sand and boulders.
Oil shows are common.

GROUP:	WILCOX	(Hatchetigbee	)
	Sabine	(Bashi or Woods Bluff)	Alabama
	Lignitic	(Tuscahoma	) Divisions.
		(Nanafalia	)

Averages about 800 feet thick in Arkansas and becomes about 1200 feet thick in Sabine Parish, Louisiana. Contains no marine fossils except along the Sabine river and in Alabama. Lignite common. Logged as sand, rocks and shale. Unconformity separates Wilcox from St. Maurice.

GROUP: MIDWAY
Wills Point Clay in Texas.

Thickness varies from 150 feet to 300 feet. Logged as shale, gumbo and gummy shale. Contains lenticular sand members which give good oil and gas shows.

SYSTEM: CRETACEOUS
SERIES: UPPER CRETACEOUS
Gulf Series
GROUP: TAYLOR MARLS or NAVARRO

Member:

1. Arkadelphia.

About 650 feet of gumbo, shale, and shale and boulders. Excellent key to Nacatoch as it is free from sand and has streaks of chalk, limestone and sypsum in its lower 200 feet. UNCONFORMITY separates the Arkadelphia from the Midway.

2. Nacatoch.
(Gas Rock)

Consists of from 100 to 250 feet of hard fossiliferous limestones and good loose sands streaked with hard rock layers. Sands become very Glauconitic near base. The pay sand is composed of very fine grains and is bluish in color.

Produces	GAS	OIL
	Caddo	Hosston-Vivian
	Elm Grove	Bossier-Shallow
	Bethany	Homer-Shallow
	Naborton	El Dorado
		Smackover.

3. Marlbrook Marl
Kickapoo Marl
Saratoga Chalk
Varies in thickness from 100 to 200 feet. Usually logged as shale and gumbo but is mostly shale and chalk. Fossiliferous.

Produces	GAS	OIL
	Webster (Show)	Smackover-Louann
	Smackover	

GROUP: AUSTIN CHALK

Member:

1. Annona Chalk
Selma Chalk
Not well defined in parts of Arkansas but is good key bed in Louisiana. Logged as 150 to 450 feet of soft and hard chalk.

Produces	OIL	
	Pine Island	Light
	Elm Grove	Heavy
	Zwolle	(Non-commercial)

2. Brownstown Marl
Averages about 100 feet of gumbo and marl with some sand lenzes.

GROUP: BIGGIN

Member:

1. Blossom sand
Sub-Clarksville
This may be better developed as a lower member of the Brownstown, but is considered of Biggin age. Consists of 30 to 150 feet of sand and sandy shale. Usually coarse and contains gravel. Generally carries salt water.

Produces	GAS	OIL
	Webster	Haynesville
	Homer	Bethany
	Smackover	Cotton Valley

2. Eagle Ford.
Consists of 30 to 300 feet of gumbo, shale and limey shale.

3. Woodbine
Bingin sand, Bexter sands, Timber Creek or Lewisville Beds. Thickness varies from few feet to over 200. UNCONFORMITY at base. Logged as Red Shale, ligniferous clays and sand.

Produces OIL
Caddo
Red River-DeSoto
Mexia.

AGE: CENOZOIC
SYSTEM: CRETACEOUS
SERIES: LOWER CRETACEOUS
COMANCHEAN

GROUP: WACHITA

Member:

1. Denison
Buda Lime (Grayson Marls)
Mainstreet Limestone

Logged as hard brown lime rock with soft shale breaks. Thickness urknown.

2. Fort Worth Lime
Exogyra Arientina of Del Rio Clays.

Logged as hard broken lime. The thickness is unknown but about 150 feet have been passed through on the Sabine Uplift. Very Fossiliferous.

Produces GAS
Bethany Field.

3. Preston
Georgetown
Washita
a. Buck Creek
b. Kiamitia Clays
Consists of some 400 feet or more of broken lime and sand rock with shale members at the base.

GROUP: FREDRICKSBURG.

Member:

1. Goodland Lime
Edwards Limestone (Produces at Tampico, Mex.)
Comache Peak
Consists of 200 and more feet of hard broken lime.

2. Walnut Clays.
About 150 feet of hard sand, sandy sho.., hard lime and hard sandy shale.

GROUP: TRINITY.

Member:

1. Paluxy Sand
Hard broken sand and lime

2. Glen Rose
Antlers Sand
Hard broken sand and shales.
Produces oil in Pine Island, La.

3. Trinity
Travis Peak Sand
Hard sand, shale and boulders.

U N C O N F O R M I T Y

PALEOZOICS
CARBONIFEROUS
PENNSYLVANIAN

Thickness unknown.

STATISTICAL SURVEY OF PRODUCTION CONDITIONS
IN THE LOUISIANA-ARKANSAS TERRITORY

These Figures Refer to Oil Production Only,
And Do Not Include Gas Wells and
Gas-Yielding Acreage.

PRODUCTION STATISTICS TO AND INCLUDING JULY, 1 9 2 4.

Field	Production Averages as of One Year Age	Present Average Prod.	No. of Oil Wells Producing	Present Average Production per well.	Total Prod. Discovery To date.	No. of acres Productive	Average Yield per acre entire field	Age of Field (Years)
			A R K A N S A S.					
Smackover Heavy	88,000	86,015	1,341	64	66,182,400	16,460	2,473	2
Smackover Light	10,250	37,765	712	53		10,300		1¾
El Dorado	21,475	12,840	1,258	10	34,223,190	9,700	3,528	3½
Stephens	3,350	2,335	225	10	1,315,730	3,200	411	2
Irma - Nevada	400	1,420	19	78	431,290	320	1,347	1¼
TOTAL	123,475	140,375	3,554	39½	112,152,610	39,980	2,805	
			L O U I S I A N A.					
Haynesville	27,350	17,980	743	24	38,490,125	6,875	5,598	3¼
Caddo	10,850	11,905	c	c	103,585,750	31,000	3,341	21
Homer	9,900	7,510	620	12	48,890,475	3,000	16,296	5½
Bellevue	8,000	4,665	266	17½	5,008,980	900	5,565	2⅔
DeSoto-Bull Bayou-Crichton	5,790	5,495	c	c	43,614,060	10,000	4,361	10
Elm Grove	1,200	820	37	22	998,025	1,000	998	6
Cotton Valley	None	7,575	30	252½	541,980	[a]400	1,355	2/3
Sarepta	75	215	3	71	31,890	a	b	2
TOTAL	63,165	56,165	[a]1,699	[d]22 8/10	241,161,285	[b]53,175	[a]4,534	
GRAND TOTAL, BOTH STATES.	186,640	196,540	[d]5,253	[d]34	353,313,895	93,155	3,792	

NOTE: [a]Area undefined; therefore, Sarepta District not included in this [b]calculation

[c]Complete figures not available; therefore, Caddo and DeSoto-Bull Bayou-Crichton Districts not included in these [d]calculations.

PRODUCTION FIGURES DO NOT INCLUDE FUEL OIL USED IN THE FIELDS.

I N D E X

I N D E X